

## **IN THE CLAIMS:**

This listing of claims will replace all prior versions, and listing, of claims in the application.

### **Listing of the Claims:**

1. (Previously presented) A phased array antenna system with controllable electrical tilt including:

- a) an antenna with multiple antenna elements;
- b) apparatus for providing two basis signals with variable relative delay therebetween,
- c) splitting apparatus for dividing the basis signals into signal components,
- d) phase to power converting apparatus for converting the signal components into transformed components having powers which vary as the relative delay varies, and
- e) power to phase converting apparatus for converting the transformed components into antenna element drive signals having phases which vary from antenna element to antenna element progressively across the antenna when the antenna is electrically tilted and which individually vary as the relative delay varies.

2. (Previously presented) A system according to Claim 1 wherein the phase to power converting apparatus comprises a plurality of hybrid radio frequency coupling devices ("hybrids") for providing sums and differences of pairs of signal components, each pair having signal components from both basis signals.

3. (Previously presented) A system according to Claim 1 wherein the phase to power converting apparatus comprises a plurality of 180 degree hybrids for providing sums and differences of pairs of signal components, each pair having signal components from both basis signals.

4. (Previously presented) A system according to Claim 3 wherein each pair has signal components of equal magnitude, but each pair's component magnitude is not equal to that of another pair.

5. (Previously presented) A system according to Claim 3 wherein the hybrids are first hybrids and the power to phase converting apparatus incorporates a plurality of second hybrids arranged to generate antenna element drive signals.

6. (Previously presented) A system according to Claim 5 wherein the splitting apparatus is a first splitting apparatus and the power to phase converting apparatus incorporates a second splitting apparatus for dividing the sums and differences into components for input to the second hybrids.

7. (Currently amended) A system according to Claim 6 wherein the first splitting apparatus is for dividing each of the basis signals into three signal components.

8. (Previously presented) A system according to Claim 6 wherein the second splitting apparatus is a plurality of two-way splitters.

9. (Currently amended) A system according to Claim 1 wherein ~~it is arranged such that~~ all paths extending from basis signal provision to antenna elements contain the same numbers and types of components.

10. (Previously presented) A method of controlling electrical tilt of a phased array antenna system including an antenna with multiple antenna elements, and wherein the method incorporates the steps of:

- a) providing two basis signals with variable relative delay therebetween,
- b) splitting the basis signals into signal components,
- c) converting the signal components into transformed components having powers which vary as the relative delay varies, and
- d) converting the transformed components into antenna element drive signals having phases which vary from antenna element to antenna element progressively across

the antenna when the antenna is electrically tilted and which individually vary as the relative delay varies.

11. (Previously presented) A method according to Claim 10 wherein step c) is implemented using a plurality of hybrids for providing sums and differences of pairs of signal components, each pair having signal components from both basis signals.

12. (Previously presented) A method according to Claim 10 wherein step c) is implemented using a plurality of 180 degree hybrids providing sums and differences of pairs of signal components, each pair having signal components from both basis signals.

13. (Previously presented) A method according to Claim 12 wherein each pair has signal components of equal magnitude, but each pair's component magnitude is not equal to that of another pair.

14. (Previously presented) A method according to Claim 12 wherein the hybrids are first hybrids and step d) is implemented using a plurality of second hybrids for generating the antenna element drive signals.

15. (Previously presented) A method according to Claim 14 wherein splitting in step b) is a first splitting and a second splitting is implemented in step d) to divide the sums and differences into components for input to the second hybrids.

16. (Previously presented) A method according to Claim 15 wherein the first splitting divides each of the basis signals into three signal components.

17. (Previously presented) A method according to Claim 15 wherein the second splitting is a plurality of two-way splits.

18. (Previously presented) A method according to Claim 10 including supplying antenna element drive signals to antenna elements via paths extending from basis signal provision and containing the same numbers and types of components.

19. (New) A phased array antenna system with controllable electrical tilt including:  
an antenna with multiple antenna elements ;

apparatus for providing first and second basis signals with variable relative delay therebetween,

splitting apparatus for dividing the first basis signal into first signal components and the second basis signal into second signal components,

phase to power converting apparatus for converting pairs of signal components into transformed components having powers which vary as the relative delay varies, each pair of signal components being a respective first signal component and a respective second signal component, and

power to phase converting apparatus for converting the transformed components into antenna element drive signals having phases which vary from antenna element to antenna element progressively across the antenna when the antenna is electrically tilted and which individually vary as the relative delay varies.

20. (New) A method of controlling electrical tilt of a phased array antenna system including an antenna with multiple antenna elements, and wherein the method incorporates the steps of:

providing first and second basis signals with variable relative delay therebetween,

splitting the first basis signal into first signal components and the second basis signal into second signal components,

converting pairs of signal components into transformed components having powers which vary as the relative delay varies, each pair of signal components being a respective first signal component and a respective second signal component, and

converting the transformed components into antenna element drive signals having phases which vary from antenna element to antenna element progressively across the antenna when the antenna is electrically tilted and which individually vary as the relative delay varies.